

The opinion in support of the decision being entered today was **not** written for publication and is **not** binding precedent of the Board.

Paper No. 19

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES

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Ex parte PETER J. CLARKE

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Appeal No. 1999-2122  
Application No. 08/564,659

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ON BRIEF

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Before GARRIS, TIMM, and PAWLIKOWSKI, Administrative Patent Judges.  
GARRIS, Administrative Patent Judge.

DECISION ON APPEAL

This is a decision on an appeal from the final rejection of claims 103-179 which are all of the claims remaining in the application.

The subject matter on appeal relates to an apparatus and to a method for providing a deposition on a planar substrate. This appealed subject matter is adequately illustrated by independent claims 103 and 124 and dependent claims 104, 105, 125 and 126. A copy of these claims, taken from the Appellant's brief is appended to this decision.

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The references relied upon by the Examiner as evidence of obviousness are:

Rainey	4,100,055	July 11, 1978
Kiyota et al. (Kiyota)	4,547,279	Oct. 15, 1985
Dietrich et al. (Dietrich '842)	4,572,842	Feb. 25, 1986
Ross	4,849,081	July 18, 1989
Scherer et al. (Scherer)	4,931,169	June 5, 1990
Dietrich et al. (Dietrich '576)	4,946,576	Aug. 7, 1990
Hurwitt et al. (Hurwitt '605)	4,957,605	Sep. 18, 1990
Wirz	4,988,422	Jan. 29, 1991
Hurwitt et al. (Hurwitt '772)	5,080,772	Jan. 14, 1992
Gilboa et al. (Gilboa)	5,108,569	Apr. 28, 1992
Clarke	5,135,634	Aug. 4, 1992
Latz et al. (Latz)	5,169,509	Dec. 8, 1992
Lueft	5,223,111	June 29, 1993

Claims 103-112, 115-127, 130, 147-152, 156, 157, 170, 174<sup>1</sup>, 176 and 178 stand rejected under 35 U.S.C. § 103 as being unpatentable over Kiyota, Rainey or Clarke in combination with Hurwitt '605 and Hurwitt '772.

Claims 114, 132-134, 137-146, 158-160, 163-169, 171-173, 175, 177 and 179 stand rejected under 35 U.S.C. § 103 as being unpatentable over Kiyota, Rainey or Clarke in combination with Hurwitt '605 and Hurwitt '77 2 as applied above, and further in

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<sup>1</sup> Due to an apparently inadvertent oversight on the Examiner's part, the statement of this rejection which appears in the answer does not list claim 174 as being subject to the rejection. However, as recognized by the Appellant (see page 18 of the brief) and as reflected by the final office action, it is clear that the above noted rejection has been applied against claim 174.

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view of Ross, Latz, Scherer and Gilboa.

Finally, claims 113, 128, 129, 131, 135, 136, 153-155 and 158-162 stand rejected under 35 U.S.C. § 103 as being unpatentable over Kiyota, Rainey or Clarke in combination with Hurwitt '605 and Hurwitt '772 as applied above, and further in view of Lueft, Dietrich '842, Dietrich '576 and Wirz.

The Appellant has separately grouped and argued the appealed claims in the manner indicated on pages 20-22 of the brief.

#### OPINION

For the reasons which follow, we will sustain the Examiner's § 103 rejections of claims 103, 107, 108, 111, 115, 120, 123, 124, 147, 151, 172-174 and 176. However, because the Examiner has failed to establish a prima facie case of obviousness, we cannot sustain his rejections of claims 104-106, 109, 110, 112-114, 116-119, 121, 122, 125-134, 137-146, 148-150, 152-165, 167, 169-171, 175 and 179. Additionally, we cannot sustain the Examiner's § 103 rejections of claims 135, 136, 166, 168, 177 and 178 because the subject matter thereof is indefinite as explained hereinafter.

We consider these last mentioned claims to be indefinite because the subject matter thereof is not consistent with the subject matter of the parent claims from which they depend. For

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example, claim 135 and claims 136 and 166 which depend therefrom are directed to an apparatus and yet inconsistently refer back (at least ultimately) to parent claim 131 which is directed to a method. In effect, these dependent apparatus claims are non-sequiturs with respect to parent method claim 131, and thus it is unclear how and to what extent these dependent apparatus claims further restrict the parent method claim. These infirmities are also present in claims 168, 177 and 178 because dependent apparatus claim 168 refers back to parent method claim 145, dependent method claim 177 refers back to parent apparatus claim 132 and dependent apparatus claim 178 refers back to parent method claim 127.

Under the circumstances recounted above, we exercise our authority pursuant to 37 CFR § 1.196(b) and hereby reject claims 135, 136, 166, 168, 177 and 178 under the second paragraph of 35 U.S.C. § 112 for failing to particularly point out and distinctly claim the subject matter which the Appellant regards as his invention.

Moreover, because no reasonably definite meaning can be ascribed to these indefinite claims, they cannot be regarded as obvious under § 103. In re Wilson, 424 F.2d 1382, 1385, 165 USPQ 494, 496 (CCPA 1970). Also see the Manual of Patent Examining Procedure § 2143.03 (Aug. 2001). It follows that the Examiner's

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§ 103 rejections of claims 135, 136, 166, 168, 177 and 178 cannot be sustained on the grounds that the claimed subject matter is indeterminent and thus cannot be assessed in relation to the issue of obviousness.

We also cannot sustain the Examiner's § 103 rejections of claims 104-106, 109, 110, 112-114, 116-119, 121, 122, 125-134, 137-146, 148-150, 152-165, 167, 169-171, 175 and 179. As correctly indicated by the Appellant in his brief, these claims, which fall within claim groupings (a) through (g) defined on pages 20-22 of the brief, require certain features that are not taught and would not have been suggested by the applied prior art. These features include, for example, the apparatus structure and method steps of group (a) claims 105 and 125 wherein a grooved substrate is provided with a deposition having a substantially uniform thickness of sputtered atoms on the substrate and on the walls of the groove in the substrate. The Examiner's basic position concerning each of the claim features argued on this appeal is based upon the proposition that the prior art apparatus appears to correspond to and must be capable of functioning the same as the here claimed apparatus. For example, regarding appealed claim 105, the Examiner points out that "[t]he claim is an apparatus claim" and argues that "[t]here is no reason to believe that the apparatus

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of the prior art would not perform the same function [as the claim 105 apparatus]" (Answer, page 5). This position is not well taken for a number of reasons.

First of all, the Examiner's position completely ignores the fact that many of the appealed claims are directed to a method rather than an apparatus. As discussed above, the Examiner apparently believes that the prior art apparatus of the applied primary references would be capable of performing the same function as the Appellant's claimed apparatus. Even if correct, however, this belief is simply irrelevant with respect to the method claims before us. Stated otherwise, even if the prior art apparatus were capable of performing the same function as the here claimed apparatus, we perceive nothing and the Examiner points to nothing in the applied references which would have suggested operating the prior art apparatus in such a manner as to perform the steps and achieve the results required by those claims under consideration which are directed to a method (e.g., see previously mentioned dependent method claim 125). Thus, with respect to such method claims, it is clear that the Examiner has failed to establish a prima facie case of obviousness.

Even considering only the claims in groups (a) through (g) which are directed to an apparatus, the Examiner's position still must be regarded as insufficient to establish a prima facie case of obviousness. The essence of this position is the Examiner's implicit belief that the prior art apparatus is inherently capable of performing the same function as the Appellant's claimed apparatus. Concerning this point, it is well settled that an Examiner must provide some evidence or scientific reasoning to establish the reasonableness of his belief that the functional limitation in question is an inherent characteristic of the prior art. Ex parte Skinner, 2 USPQ2d 1788, 1789 (Bd. Pat. App. & Int. 1986). This is because the initial burden of establishing a prima facie basis to deny patentability rests upon the Examiner. Ex parte Levy, 17 USPQ2d 1461, 1463-64 (Bd. Pat. App. & Int. 1990).

No such evidence or scientific reasoning has been provided by the Examiner on the record of this appeal to support his view that the functional limitations of the apparatus claims under consideration are inherent characteristics of the prior art.<sup>2</sup>

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<sup>2</sup> Indeed, the Examiner seems to be under the erroneous impression that the Appellant must provide a reason for believing the contrary as evinced by the Examiner's previously quoted statement "[t]here is no reason to believe that the apparatus of the prior art would not perform the same function  
(continued...)

As an example, it is the Examiner's position that the apparatus of the prior art would be capable of performing the apparatus claim 105 function of depositing a substantially uniform thickness on the surface of the substrate and on the walls of the groove in the substrate. According to appealed claim 155 which depends from claim 105, this function is achieved by virtue of the claim 105 apparatus capability of being operated at certain anode positive voltages and certain target negative potentials. The Examiner has provided no basis whatsoever for concluding that the apparatus of the prior art possesses the capability of being operated at such voltages and potentials. As a result, we are constrained to conclude that the Examiner has failed to establish a prima facie basis in support of his position that the prior art apparatus would be capable of performing the apparatus claim 105 function. For analogous reasons, the Examiner likewise has failed to carry his burden of establishing a prima facie case with respect to the other apparatus claims in groups (a) through (g) of this appeal<sup>3</sup>.

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<sup>2</sup>(...continued)  
[as the claim 105 apparatus]" (Answer page 5).

<sup>3</sup> As a matter of clarification, we point out that appealed claim 148 has been improperly listed by the Appellant in group (f) since this claim does not recite the feature associated with group (f). Clearly, claim 148 should be considered as part of  
(continued...)



We reach a different conclusion with respect to appealed claims 103, 107, 108, 111, 115, 120, 123, 124, 147<sup>4</sup>, 151, 172-174 and 176. According to the Appellant, "[t]hese claims recite that the voltage between an anode and a target has a magnitude, and the positive voltage on the anode has a magnitude, to obtain a deposition of the sputtered atoms from the target on the substrate with particular characteristics dependent upon the magnitude of the anode voltage and the difference between the anode voltage and the target voltage", and it is argued that "[t]hese features are not disclosed in any of the references" (brief, pages 31-32). This argument is unpersuasive.

Like the above noted claims, the primary references disclose apparatus and methods having voltages and magnitudes such that

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<sup>3</sup>(...continued)  
group (g) (e.g., as revealed by a comparison of this claim with claim 149 which is associated with group (g)). For these reasons, we have treated claim 148 as being in group (g).

<sup>4</sup> The Appellant also has inappropriately listed appealed claim 147 as being in group (f). Again, this claim does not recite the feature associated with group (f). Instead, claim 147 recites a feature which has not been argued and which is correspondingly recited in appealed claim 151. Under these circumstances and in order to properly resolve the issues before us on this appeal, we have treated claim 147 as being in the same group as claim 151 which is group (h).

sputtered atoms from the target are deposited on the substrate (e.g., see Figure 1 of Clarke and the disclosure relating thereto). The resulting deposition has particular characteristics such as the characteristics necessary and desirable in a wafer for an integrated circuit chip (e.g., see lines 5-12 in column 1 of Clarke). The achievement of these characteristics must be regarded, at least in part, as due to the aforementioned voltages and magnitudes since, in the absence of appropriate voltages and magnitudes, the functional wafer product desired by these primary references would not have been attained. Therefore, the characteristics of the deposition obtained in the primary reference apparatus and methods must be regarded as dependent upon the magnitudes and voltages of these apparatus and methods as required by the appealed claims in group (h).

It follows that we will sustain the Examiner's § 103 rejections of claims 103, 107, 108, 111, 115, 120, 123, 124, 147, 151, 172-174 and 176.

In addition to affirming the examiner's rejection of one or more claims, this decision contains a new ground of rejection pursuant to 37 CFR § 1.196(b) provides, "A new ground of rejection shall not be considered final for purposes of judicial review."

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Regarding any affirmed rejection, 37 CFR § 1.197(b) provides:

(b) Appellants may file a single request for rehearing within two months from the date of the original decision . . . .

37 CFR § 1.196(b) also provides that the appellant, WITHIN TWO MONTHS FROM THE DATE OF THE DECISION, must exercise one of the following two options with respect to the new ground of rejection to avoid termination of proceedings (37 CFR § 1.197(c)) as to the rejected claims:

(1) Submit an appropriate amendment of the claims so rejected or a showing of facts relating to the claims so rejected, or both, and have the matter reconsidered by the examiner, in which event the application will be remanded to the examiner. . . .

(2) Request that the application be reheard under § 1.197(b) by the Board of Patent Appeals and Interferences upon the same record. . . .

Should the appellant(s) elect to prosecute further before the Primary Examiner pursuant to 37 CFR § 1.196(b)(1), in order to preserve the right to seek review under 35 U.S.C. §§ 141 or 145 with respect to the affirmed rejection, the effective date of the affirmance is deferred until conclusion of the prosecution before the examiner unless, as a mere incident to the limited prosecution, the affirmed rejection is overcome.

If the appellant(s) elect prosecution before the examiner and this does not result in allowance of the application, abandonment or a second appeal, this case should be returned to the Board of Patent Appeals and Interferences for final action on the affirmed rejection, including any timely request for rehearing thereof.

The decision of the Examiner is affirmed-in-part.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 CFR § 1.136(a).

AFFIRMED-IN-PART

BRADLEY R. GARRIS	)	
Administrative Patent Judge	)	
	)	
	)	
	)	
	)	BOARD OF PATENT
CATHERINE TIMM	)	APPEALS
Administrative Patent Judge	)	AND
	)	INTERFERENCES
	)	
	)	
	)	
BEVERLY A. PAWLIKOWSKI	)	
Administrative Patent Judge	)	

BRG/jrg

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APPENDIX

103. An apparatus for providing a deposition on a planar substrate, including,

a planar anode disposed in displaced and substantially parallel relationship to the substrate,

a target spaced from the anode to serve as a cathode, the target having properties of emitting sputtered atoms when bombarded by gaseous ions and of directing the sputtered atoms to the substrate, the target having a hollow substantially frusto-conical configuration with an axis substantially perpendicular to the anode and the substrate,

first means for defining a cavity between the anode and the target for receiving atoms of an inert gas,

means for introducing the inert gas into the cavity,

second means for applying a positive voltage to the anode and a negative voltage to the target relative to the positive voltage on the anode to establish a flow of electrons from the target toward the anode and a glow discharge between the target and the anode to ionize atoms of the inert gas in the cavity, and

third means disposed relative to the anode and the target for providing a movement of the electrons between the target and the anode through other than a straight line path to enhance the ionization of the atoms of the inert gas and the emission of the sputtered atoms from the target for movement toward the substrate,

the third means being at a potential lower than the positive voltage on the anode,

the voltage between the anode and the target having a magnitude, and the positive voltage on the anode having a magnitude, to obtain depositions of the sputtered atoms from the target on the substrate with particular characteristics dependent upon the magnitude of the anode voltage and the difference between the anode voltage and the target voltage,

the anode, the gas-introducing means, the first means, the second means and the third means being disposed relative to the target and the substrate to provide for the flow of the sputtered atoms from the target to the substrate without any obstruction.

104. An apparatus as set forth in claim 103, including,

there being in the substrate a groove defined by walls,

a shield disposed between the anode and the substrate without obstructing the flow of sputtered atoms from the target to the substrate and operative at a potential less than the positive voltage on the anode to receive charged particles moving toward the substrate,

there being a positive voltage on the anode with a magnitude, and there being a voltage difference between the anode and the target with a magnitude, to obtain a deposition on the substrate of the material of the target to fill the groove and to provide a deposition with a substantially smooth surface of the deposition on the substrate at the positions of the groove and at the positions removed from the groove.

105. An apparatus as set forth in claim 103, including,

there being in the substrate a groove defined by walls,

the third means including magnetic means for providing a substantially constant magnetic field for increasing the distance of movement of the electrons toward the target to enhance the ionization of the atoms of the inert gas in the cavity, the third means including the magnetic means being operative to enhance the ionization of the atoms of the inert gas in the cavity without obstructing the flow of the sputtered atoms from the target to the substrate,

the substrate being at a voltage lower than the positive voltage on the anode,

the anode having a magnitude, and the difference between the voltages on the anode and the target having a magnitude, to obtain a deposition of a substantially uniform thickness of the sputtered

atoms from the target on the surface of the substrate and on the walls of the groove in the substrate.

124. In a method of providing a deposition of sputtered atoms, the steps of:

providing a planar substrate with a groove in the substrate, the groove being defined by walls, the steps of:

providing a planar anode in a spaced and substantially parallel relationship to the substrate,

providing a target in spaced relationship to the anode to define a cavity, the target having a hollow frusto-conical configuration with an axis substantially perpendicular to the planar anode and the planar substrate,

providing a positive voltage on the anode and, on the target, a voltage negative relative to the positive voltage to establish an electrical field between the anode and the target and to establish a glow discharge between the anode and the target for the emission of electrons from the target and the movement of the electrons toward the anode,

introducing atoms of a neutral gas into the cavity,

providing a substantially constant magnetic field in a direction substantially perpendicular to the electrical field to facilitate the production of charged particles from the atoms of the neutral gas by the electrons and the movement of the charged particles toward the target for the sputtering of atoms from the target and the movement of the sputtered atoms toward the substrate,

the positive voltage on the anode and the negative voltage on the target having a difference to obtain a deposition of the sputtered atoms on the substrate and a deposition on the walls of the groove in the substrate with particular characteristics,

the sputtered atoms flowing from the target to the substrate without obstruction from the anode and the production of the magnetic field.



125. In a method as set forth in claim 124 wherein

the positive voltage on the anode and the negative voltage on the target have values to provide a deposition of the sputtered atoms with a substantially uniform thickness on the substrate and on the walls of the groove in the substrate.

126. In a method as set forth in claim 124 wherein

the positive voltage on the anode and the negative voltage on the target have values to provide a substantial filling of the groove of the substrate with the sputtered atoms and to provide the deposition of the sputtered atoms with a substantially planar surface on the substrate including the filled groove.

